

## Intelligent node for fibre-optic networks

If you are looking for the ultimate optical node on the market, look no further than Teleste's AC9000. This highly scalable, intelligent optical node is our latest generation of 1 GHz optical node platforms, which adapts itself to fit the variable demands of the networks. For working towards ever greater speed and agility, with lower power consumption, the AC9000 is a trusted partner and an environmentally responsible choice.



## Intelligent fibre-optic node

### Key strengths

- Supports 1 GHz downstream and up to 85 MHz upstream
- Wide range of upstream transmitters available with either Fabry-Perot or DFB lasers
- Digital upstream transmitters
- Automatic or manual ingress switching
- Double power factor-corrected PSUs
- Superior ESD and Surge protection

The AC9000 is an intelligent fibre-optic node with best-of-breed functionality for increasing the quality and quantity of data and video services distributed within HFC networks. It is able to adjust itself automatically and effectively. The automatic features greatly reduce the possibility of human errors, as well as time consuming and inefficient network operations. Most importantly, it means cutting down operating costs and increasing customer satisfaction.

## Digital benefit

All four traditional upstream transmitters can be replaced with two digital return path modules, thus providing savings on fibre infrastructure costs. The new digital return path technology also ensures an excellent upstream signal quality and allows longer fibre links.

Intelligent upstream and downstream signal routing without any plug-in accessories.

The AC699x transponder module is used to add remote connectivity, ALSC and upstream and downstream signal monitoring functionality to the AC9000 optical node platform.

The optical transmitters and optical receivers used in the AC9000 are equipped with a new, innovative, integrated fibre organiser for easier module installation.

Amplifier stages with the latest GaN technology ensure optimised power consumption and performance.

A full range of transmitters using various laser technologies are available.

The user-friendly design of the fibre tray provides a convenient splicing and storing location for fibre-optic cables. Individual fibre organiser modules allow easy access to each cable without disruption to surrounding cables.

Position for CWDM multiplexer



### No more unnecessary truck rolls

Labour intensive network maintenance is often the prime reason for high operating expenses. This also means that manual network operations are prone to human error, which leads to unnecessary truck rolls and service interruptions. The AC9000 tackles these problems by bringing intelligence to the network.

With the AC9000, all configurations are done automatically without the maintenance crew having to adjust and configure each device separately. This capability is achieved through the use of a new microprocessor-based control system, which performs all of the adjustments automatically and without signal interruptions.

### Node for European networks

Environmental values and business benefits need not conflict. An efficient mechanical design optimising the use of manufacturing materials and high performance fitted into a small space greatly affect both capital and operational expenditure. All of this favours both the environment and the operator.

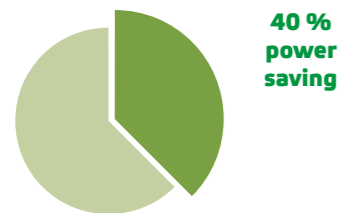
As a node of compact size, the AC9000 fits easily into European-scale street cabins, while the high performance means fewer units in the field. Low power consumption generates less heat, which increases component durability and – of course – leads to higher service quality and lower lifespan costs. Imagine how it would affect both your company's expenditure and the environment if there would be x number of units in the network and if every unit would consume 40% less energy than conventional nodes.

### Always in control

Conventional mechanical adjustments and checking the parameters are laborious and time-consuming processes. The days of frequent periodic maintenance are over. In addition to being automatically aligned, the AC9000 can be monitored and controlled remotely via the optional plug-in transponder unit included with Teleste's CATVisor EMS network management software. The transponder unit offers three different management protocols: CATVisor, HMS and DOCSIS. If it is necessary to go on site, the AC9000 can be configured locally via its USB interface using a PC or PDA equipped with CATVisor Commander software.

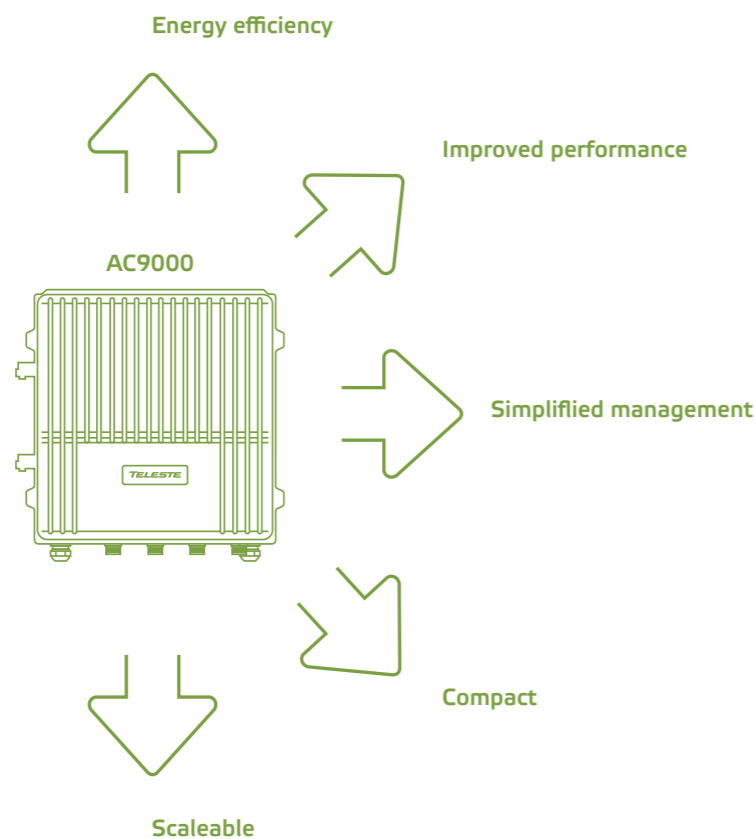
### Numerical fact

AC9000 Intelligent fibre-optic node uses 40% less energy than comparable solutions on the market.



### AC9000 and environment

- Advanced GaN hybrids with automatic power optimisation
- Power supplies with active power factor correction
- Compact size with reduced material consumption
- High performance means less active units in the field
- Operational savings with a superior remote monitoring system



### Reduce service outages

Service reliability is one of the key factors in achieving and maintaining high customer satisfaction. Reducing service outages and providing better service to end-users will eventually result in a reduced churn rate and increased profitability.

The AC9000's comprehensive control system replaces conventional mechanical adjustments and the laborious checking of parameters with a reliable system that responds quickly to any indication of a problem. The early warning system allows you to rectify any inefficiency before it becomes a real problem, and reduces unexpected, costly downtime to an absolute minimum. In turn, this leads to several operational benefits, such as improved network reliability and performance.

### Guarantee the quality

Even under the best of circumstances, maintaining a network with essential services can be a challenge. As the number of required high-quality services increases, there is a growing interest in systems that can guarantee the continuity of these services. The AC9000 supports optical link redundancy as well as redundant powering. The possibility of having different backup solutions provides simple and flexible switching architectures.

Far too often, ingress can disrupt services and irritate end-users. The AC9000 recognises and automatically isolates ingress with the help of an inbuilt ingress analyser. This is done even before your helpdesk has received a single call from subscribers blocked by the problem.

### Exploit the fibre to the max

With network capacity needs and services increasing, there is not always enough existing fibre. Installing new fibre is always a laborious project involving high costs, and in some locations it is not a realistic option. There are essentially two ways to increase network capacity: utilise new optical fibres or increase the capacity of existing ones. Most operators are primarily exploring the latter approach when possible.

In such cases, the digital return path is a new approach to offer an easy way to increase the capacity of existing fibres. Using the AC9000 with a 2 x 4 digital upstream option provides an operator with the potential to double the capacity of existing fibres without major investments. The digital return path provides easy adjustment features and, most importantly, upgrades the network so that it is ready for future demands. The distance between nodes can be extended up to 75 km. The digital return path carries two separate 5-85 MHz bandwidths at 5 Gbps. All of this is available in a size suitable for European street cabins.



### 16 available wavelengths

The AC7700 digital return path transmitter converts two analog upstream signals in the node into a single, digital CWDM carrier on any of the 16 available wavelengths over distances of up to 75 km. This possibility, together with the AC9000, allows multiple nodes to share a common return fibre, making use of the existing infrastructure a cost-effective strategy.

# Intelligent network investment

## The AC9000 in a traditional HFC solution

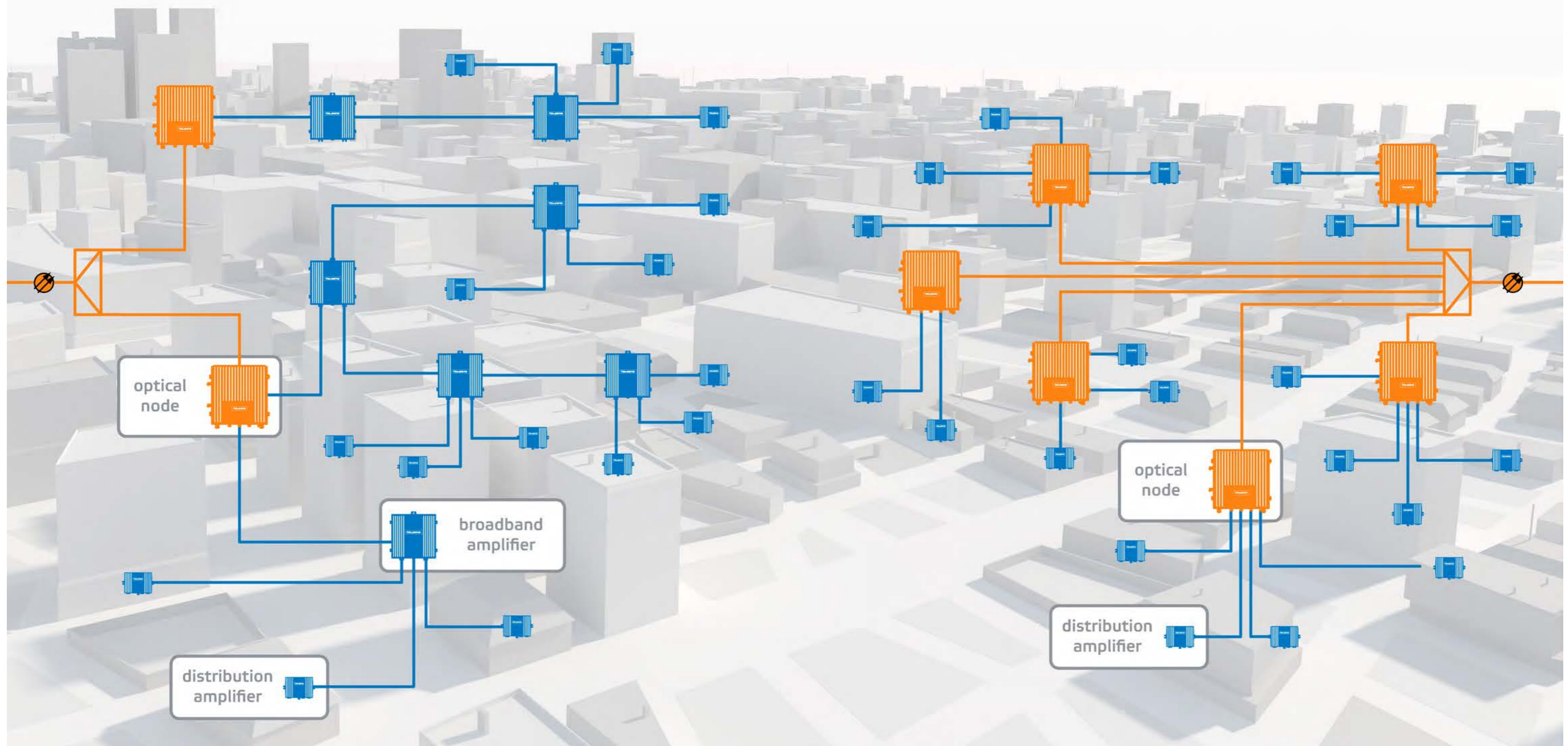
The AC9000 is the preferred option for refurbishing in areas with low initial fibre penetration, when future proof of performance, scalability, cost efficiency, monitoring options and easy installations are prime concerns. The traditional solution offers:

- Easy way for increasing broadband penetration and reaching out to new users
- Access to high transmission capacity at a low cost

## The AC9000 in a deep fibre solution

The deployment costs for the whole optical communication infrastructure are high, but the associated costs can be mitigated with an alternative approach. Existing coaxial networks can be updated using a hybrid solution where fibre cables are taken to the roadside and individual customer connections remain on a coaxial cable. The deep fibre solution offers:

- Access to high transmission capacity at a low cost
- Flexibility of installing fibre cable on demand, which minimizes initial installation costs
- Less active components in the network



# Technical specifications

## RF CHARACTERISTICS

Downstream signal path		Upstream signal path	
Frequency range	70...1006 MHz	Frequency range	5...85 MHz
Return loss	20 dB	Return loss	18 dB
Flatness	± 0.5 dB	Ingress switching	0 / -6 / < -45 dB
Gain limited output level	4 x 112 dB $\mu$ V / 2 x 116 dB $\mu$ V	Input level	57.0 dB $\mu$ V
Slope control range	0...20 dB	OMI adjustment	0...-20 dB
Noise current density	5.5 pA / $\nu$ Hz		
CTB 41 channels	116.0 dB $\mu$ V		
CSO 41 channels	116.0 dB $\mu$ V		
XMOD 41 channels	112.5 dB $\mu$ V		

## OPTICAL CHARACTERISTICS

AC6610 optical receiver			
Light wavelength	1290...1600 nm	Optical input power	-7...0 dBm
Output level	72.5 dB $\mu$ V	Output level adjustment	20 dB
AC6740 return path transmitter		AC6745 return path transmitter	
Light source	1310 nm FP	Light source	1310 nm DFB
Optical output power	+1 dBm	Optical output power	+3 dBm / +6 dBm
Frequency range	5...65 / ...85 / ...200 MHz	Frequency range	5...65 / ...85 / ...200 MHz
Pilot frequency	4.5 MHz / 6.5 MHz / no pilot	Pilot frequency	4.5 MHz / 6.5 MHz / no pilot
AC67xx return path transmitters			
Light source	CWDM units are available with DFB laser of 8 wavelengths.		
Optical output power	+3 dBm / +6 dBm		
Frequency range	5...65 / 85 / 200 MHz		
Pilot frequency	4.5 MHz / 6.5 MHz / no pilot		
AC7700 digital return path transmitters			
Light source	CWDM units are available with DFB laser of 16 wavelengths.		
Optical output power	+5 dBm		
Frequency range	5...65 or 5...85 MHz		
Bit rate	5 Gbps in optical link		
Analog to digital conversion	12 bits		
Number of RF inputs	2		
Number of optical outputs	1		

## AC6991 TRANSPONDER MODULE (CATVisor and HMS ) | AC6980 TRANSPONDER MODULE (DOCSIS)

RF modem		RF level measurements	
Power consumption	1.8 W   3.9 W	DS measurement range	50...1006 MHz
DS frequency range	80...155 MHz   108...862 MHz	US measurement range	5...85 MHz
US frequency range	5...45 MHz   5...65 MHz	Measurement bandwidth	0.35 MHz
DS input level range @ transponder	50...90 dB $\mu$ V   50...80 dB $\mu$ V	DS dynamic range	80...120 dB $\mu$ V @ node out
DS output level range @ transponder	75...104 dB $\mu$ V   70...112 dB $\mu$ V	US dynamic range	15...75 dB $\mu$ V @ node in

## GENERAL CHARACTERISTICS

Power consumption	61 W	Dimensions (h x w x d)	360 mm x 350 mm x 140 mm
Supply voltage	30...65 V AC	Weight	10 kg
Max current feed trough	12 A / port	Operating temperature	-40...+55°C
Hum modulation	70 dB	Class of enclosure	IP54
Optical connectors	SC/APC, FC/APC, E-2000	EMC compatibility	EN50083-2
Output portss	PG11	ESD	4 kV
Test point connectors	F female	Surge	6 kV